

# One Session of Repeated Parietal Theta Burst Stimulation Trains Induces Long-lasting Improvement of Visual Neglect

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Visual neglect is a frequent disability in stroke and adversely affects mobility, discharge destination and the length of hospital stay. It is assumed that its severity is enhanced by a released interhemispheric inhibition from the unaffected towards the affected hemisphere. We aimed to test whether parietal inhibitory theta burst transcranial magnetic stimulation (TBS) over the unaffected hemisphere can induce a long lasting improvement of visual neglect by reducing the interhemispheric inhibition.

Eleven patients with left-sided visual neglect due to subacute right hemispheric stroke were included in the study. Four conditions were tested: 1) two trains of TBS over the left contralesional posterior parietal cortex (PPC); 2) four trains of TBS over the contralesional PPC; 3) sham stimulation over the contralesional PPC; 4) control condition without any intervention. The TBS effect on visual neglect improvement was evaluated with PVT, a subtask of the Vienna Test System. The primary outcome was the number of perceived left and right visual targets. After a baseline testing, stimulation was applied and the performance was evaluated at 1 hour, 3 hours, 8 hours, 24 hours, 32 hours, and 96 hours after stimulation.

Two trains of TBS over the contralesional PPC significantly increased the number of perceived left visual targets for up to 8 hours as compared to the baseline testing. No significant improvement was found with sham stimulation and in the control condition without any intervention. The application of four trains of TBS disproportionately prolonged the stimulation effect: a significant increase of perceived left visual targets was found for up to 32 hours after stimulation.

Inhibitory TBS over the unaffected PPC improved visual neglect suggesting a reduction of interhemispheric inhibition. The disproportionate prolongation of the stimulation effect following repeated TBS trains within one session suggests long-term potentiation like mechanisms on cortical synapses. Future studies will have to examine whether TBS can improve neglect also on the level of daily activity and thus may have a therapeutic potential.